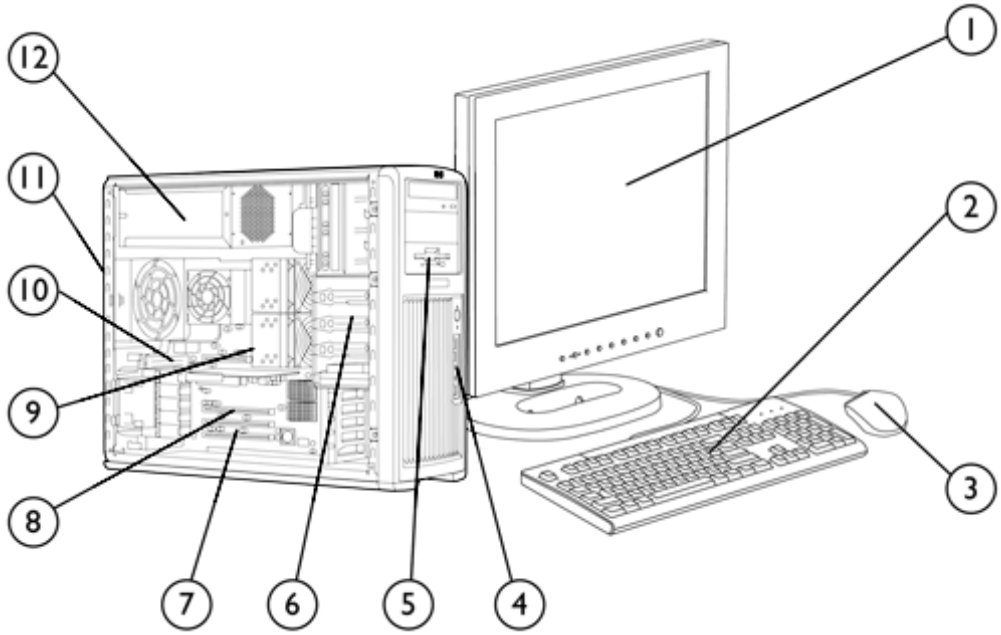
Overview

HP recommends Windows Vista® Business



1. Monitor (sold separately)
2. Standard Keyboard (USB or PS/2)
3. Mouse (USB or PS/2)
4. Front IO: 2 USB 2.0, IEEE-1394 (standard), headphone and microphone
5. 5.25" external bay for optional diskette drive, optical drive or additional 5.25"/3.5" device
6. 5 internal 3.5" bays, 3 external 5.25" bays
7. 1 PCI, 2 PCI-X slots, 2 PCI Express x8 slots
8. 2 PCI Express x16 Graphics slots
9. Dual-Core AMD Opteron™ Processors 2000 series
10. 8 DIMM slots for DDR2 memory
11. 6 USB 2.0, 1 standard serial port, 1 IEEE 1394, 2 PS/2, 2 RJ-45, SPDIF out, audio in/out, microphone
12. 800 watt power supply

Overview

At A Glance

- Up to two Dual-Core AMD Opteron 2000 series processors with 1 GHz HyperTransport™ bus interconnects. Liquid or air-cooled options.
- Choice of Operating Systems Preloaded:
  - Genuine Windows® Vista™ Business 32 or 64
  - Genuine Microsoft Windows Vista™ Business 64-bit downgrade to Microsoft Windows XP Professional x64
  - Genuine Microsoft Windows Vista™ Business 32-bit downgrade to Microsoft Windows XP Professional
  - Genuine Windows XP Professional
  - Genuine Windows XP Professional x64 Edition
  - Red Hat Enterprise Linux® WS 4 (Update 4 or later) (32- or 64-bit version)
  - HP Linux Installer Kit (see www.hp.com/workstations/software/linux):
    - Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version)
    - Red Hat Enterprise Linux WS 3 (Update 8) (32 or 64 bit version)
    - For detailed OS/hardware support information for Linux, see: www.hp.com/support/linux_hardware_matrix
- Up to 64 GB of DDR memory, with dual CPUs and 8 GB DIMMs, using integrated CPU memory controllers
- Dual PCI Express x16 graphics slots
- Support for NVIDIA Scalable Link Interface to link dual graphics cards
- Dual integrated NVIDIA Gigabit ethernet
- Six channel SATA 3 Gb/s and 8 channel SAS controller, with factory-configured RAID (Factory integrated RAID is Microsoft Windows only)
- Integrated HD audio with internal speaker
- Pre-loaded Manageability tools (Microsoft Windows only)
- Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.

Standard Features - Custom Components

Processor and Speed – One of the following

Dual-Core AMD Opteron Processor 2000 series with 1 GHz HyperTransport™ Technology bus, 1 MB L2 cache per core, optional liquid cooling available.

AMD Opteron Processor Model 2210/ 1.80 GHz
AMD Opteron Processor Model 2212/ 2.00 GHz
AMD Opteron Processor Model 2214/ 2.20 GHz
AMD Opteron Processor Model 2216/ 2.40 GHz
AMD Opteron Processor Model 2218/ 2.60 GHz
AMD Opteron Processor Model 2220SE/ 2.80 GHz (configure to order only)
AMD Opteron Processor Model 2220/ 2.80 GHz
AMD Opteron Processor Model 2222SE/ 3.00 GHz – air cooled
AMD Opteron Processor Model 2222SE/ 3.00 GHz – liquid cooled
AMD Opteron Processor Model 2224SE/ 3.20 GHz – air cooled
AMD Opteron Processor Model 2224SE/ 3.20 GHz – liquid cooled

NOTE: Dual Core is a new technology designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefit; check with software provider to determine suitability. Not all customers or software applications will necessarily benefit from use of this technology.

Operating System – One of the following

Genuine Windows Vista Business 64*

Genuine Windows Vista Business 32*

Genuine Microsoft Windows Vista™ Business 64-bit downgrade to Microsoft Windows XP Professional x64

Genuine Microsoft Windows Vista™ Business 32-bit downgrade to Microsoft Windows XP Professional

Genuine Windows XP Professional SP2

Genuine Windows XP Professional x64 Edition
(See http://www.hp.com/workstations/pws/windowsxp64/)

* The following components are not yet supported on Microsoft Vista Business and HP Workstations; ATI graphics, 1394b cards, dual graphics configurations, Scalable Link Interface (SLI) used on NVIDIA graphics cards, Creative SoundBlaster X-fi, RAID 5 10 or data array

Red Hat Enterprise Linux WS 4 (32-bit/64-bit)
NOTE: The RHEL3 U4 (x86) OS will operate correctly with most options after some manual configuration steps. Please refer to the Release Notes Chapter in http://www.hp.com/support/linux_user_manual.

HP Installer CD for Red Hat Enterprise Linux WS 4
See http://www.hp.com/workstations/software/linux/
Click on "Hardware support matrix" under "Related links" for details.

NOTE: An AMD64-enabled workstation should provide leading performance for many 32-bit applications. Although not all 32-bit applications may run as normal when you decide to change to a 64-bit operating system, many will, providing excellent flexibility. It is advised to pre-test your applications by visiting Microsoft's 64-bit 120-day free trial (http://www.microsoft.com/windowsxp/64bit/evaluation/trial.mspx) before you switch to a 64-bit processor with a 64-bit operating system. AMD64 requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for a 64-bit processor. Processor will not operate (including 32-bit operation) without a 64-bit enabled BIOS. Performance will vary depending on your hardware and software configurations.

Standard Features - Custom Components

Power Supply Cord*	Specially rated cord supplied * Use only Power Supply Cord supplied with the HP xw9400 workstation. This is a specially rated power cord.

1-5 Hard Disk Drives - Up to 5 SATA drives , or 4 SAS drives	SATA Hard Drive	Windows Vista	Windows XP	Red Hat Linux
	80 GB 7200 rpm SATA 3.0Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	160 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	250 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	500 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	750 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	80 GB 10K rpm SATA 1.5Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	160 GB 10K rpm SATA 1.5Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	* NCQ (Native Command Queuing) not supported in Red Hat Enterprise Linux			
	Serial Attached SCSI (SAS) Hard Drives			
	146 GB 10K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	73 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	146 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	300 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

Drive controllers	Windows Vista	Windows XP	Red Hat Linux
Integrated Serial ATA 3 Gb/s controller (6 channels). With RAID 0, RAID 1, RAID 1+0 capability		32-Bit, 64-Bit	WS 3 & WS 4- no hardware RAID
Integrated 8 channel SAS controller, With RAID 0, RAID 1, RAID 0+1 capability	32-Bit, 64-Bit, RAID 0,1 supported and factory integrated	32-Bit, 64-Bit	WS3 & WS4- no hardware RAID

NOTE: Hardware Controller supported by Linux except for any of the RAID features. For customers requiring RAID functionality, consider using Software RAID functionality that is controller independent and provided within Red Hat Enterprise Linux.

Standard Features - Custom Components

Factory Integrated RAID		Windows Vista	Windows XP	Red Hat Linux
	HP RAID 0 (Striped Array) Configuration - 750 GB HD Drive not supported. 3rd HD Drive can not be 500 GB.	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	HP RAID 0 Data Array Configuration - 4th HD Drive can't be 750 GB. 5th HD Drive can't be 500 GB	Not supported	32-Bit, 64-Bit	Not supported
	HP RAID 1 (Mirrored Array) Configuration - 2 HD Drives only	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	HP RAID 5 (Parity Array) Configuration - If SATA,only 80 GB or 160 GB drives allowed. If SAS, controller card required.	Not supported	32-Bit, 64-Bit	Not supported
	HP RAID10 Striped/Mirrored Configuration - Must have 4 HD Drives..	Not supported	32-Bit, 64-Bit	Not supported
	NOTE: RAID 0, 1 requires 2 identical hard drives (speeds, capacity, interface); SATA RAID 0, 1 and SCSI RAID 0, 1 available as options. Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.			

Memory - One of the following	PC2-4200 (DDR2-533 MHz) Memory DIMMs DUAL PROCESSOR ONLY	Windows Vista	Windows XP	Red Hat Linux
	HP 32 GB (8x4 GB) PC2-4200 DDR2-533 ECC Registered *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	PC2-5300 (DDR2-667 MHz) Memory DIMMs SINGLE PROCESSOR ONLY			
	HP 1 GB (2x512) PC2-5300P DDR2-667 ECC Registered SingProc	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 2 GB (2x1 GB) PC2-5300P DDR2-667 ECC Registered SingProc	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 4 GB (2x2 GB) PC2-5300P DDR2-667 ECC Registered SingProc	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 4 GB (4x1 GB) PC2-5300P DDR2-667 ECC Registered SingProc	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	DUAL PROCESSOR CONFIGS REQUIRED			
	HP 2 GB (4x512 MB) PC2-5300P DDR2-667 ECC Registered	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 4 GB (4x1 GB) PC2-5300P DDR2-667 ECC Registered	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 6 GB (4x1 GB+4x512) PC2-5300P DDR2-667 ECC Registered	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 8 GB (8x1 GB) PC2-5300P DDR2-667 ECC Registered	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 8 GB (4x2 GB) PC2-5300P DDR2-667 ECC Registered	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

	HP 12 GB (4x2+4x1) PC2-5300P DDR2-667 ECC Registered	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP 16 GB (8x2 GB) PC2-5300P DDR2-667 ECC Registered	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

* Not supported with two fx4500 graphics plus 120W processor and fifth hard drive. Not supported with two fx4600 graphics.

Removable Storage (Up to 2 of the following drives)		Windows Vista	Windows XP	Red Hat Linux
	HP No Floppy Drive Option	N/A	N/A	N/A
	1.44 MB Diskette Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	HP No Optical Drive Option	N/A	N/A	N/A
	16X/40X DVD-ROM Drive		32-Bit, 64-Bit	WS 3, WS 4
	SATA 48X CD-RW/DVD-ROM Combo Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	SATA SuperMulti DVD+/-RW LightScribe** Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

* LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players

Input Devices	Keyboard - One of the following*	Windows Vista	Windows XP	Red Hat Linux
	PS/2 Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	USB Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	Mouse - One of the following*			
	PS/2 2-Button Scroll Mouse (mechanical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	USB 3-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	USB 3-Button 2.9M Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

* Mixing PS/2 and USB Keyboards and Mice are not supported with Linux OS.

Audio		Windows Vista	Windows XP	Red Hat Linux
	Integrated HD sound with internal speaker	32-Bit, 64-Bit	32-Bit	
	Sound Blaster X-Fi XtremeMusic Audio Card	Not supported	32-Bit, 64-Bit	
	HP Optical Drive Internal Audio Cable	32-Bit, 64-Bit	32-Bit, 64-Bit	

NIC (Network Interface Controller)		Windows Vista	Windows XP	Red Hat Linux
	Integrated dual NVIDIA 10/100/1000 LAN	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	Broadcom 5751 Netxtreme Gigabit LAN (PCI Express)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

Standard Features - Custom Components

Graphics	Windows Vista	Windows XP	Red Hat Linux
NVIDIA Quadro NVS 285* PCIe (128 MB, VGA & DVI)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro NVS 290 PCIe (256 MB) *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4
NVIDIA Quadro FX 560* PCIe (128 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 570 PCIe (256 MB)*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4
NVIDIA Quadro FX 1500* PCIe (256 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 1700 PCIe (512 MB) *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4
NVIDIA Quadro FX 3500* PCIe (256 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 4500* PCIe (512 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 4600* PCIe (768 MB) - Not supported with 120W processors	Not supported	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA Quadro FX 5500* PCIe (1 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

* May use two graphics cards. Must use matching graphics cards and order a second processor. SLI and dual configurations are not supported for Microsoft Windows Vista.

Graphics Connectors	Windows Vista	Windows XP	Red Hat Linux
NVIDIA Quadro G-Sync Card*	Not supported	32-Bit, 64-Bit	WS 3, WS 4
NVIDIA SLI Graphics Connector **	Not supported	32-Bit, 64-Bit	

* Only supported on NVIDIA Quadro FX 45xx and newer series graphics cards.
** Only supported on NVIDIA Quadro FX 3500, 4500 and 5500 and newer series graphics cards.

Miscellaneous	Windows Vista	Windows XP	Red Hat Linux
IEEE 1394b FireWire 800 3-Port PCI Card (1-port 1394a & 2-ports 1394b)	Not supported	32-Bit, 64-Bit	Not Supported
Hood intrusion sensor	Yes	32-Bit, 64-Bit	N/A
SCSI U320 Back Panel Connect	Yes		
HP xw84/94 SAS Back Panel Connector Kit	Yes		
HP Workstation Mouse Pad	N/A	N/A	N/A

Software	Windows Vista	Windows XP	Red Hat Linux
Symantec AntiVirus 10 (optional preinstall)	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
Optional Microsoft Office 2007 Trial Edition	32-Bit (English language only)	32-Bit	N/A
Optional Microsoft Office 2007 Small Business Edition	32-Bit (English language only)	32-Bit	N/A
PDF Complete	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP Performance Tuning Framework	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
HP Client Manager Software v6.0	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
Optional HP Protect Tools Security Solutions	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported

After-Market Options

Processors	2nd AMD Opteron processor with AMD64 Technology and 1.00 GHz HyperTransport™ Technology	Part Number
	Dual-Core AMD Opteron Processor Model 2220/ 2.80 GHz, 2 MB L2 cache (1 MB per core)	RC403AA
	Dual-Core AMD Opteron Processor Model 2212/ 2.00 GHz, 2 MB L2 cache (1 MB per core)	EW295AA
	Dual-Core AMD Opteron Processor Model 2214/ 2.20 GHz, 2 MB L2 cache (1 MB per core)	EW296AA
	Dual-Core AMD Opteron Processor Model 2216/ 2.40 GHz, 2 MB L2 cache (1 MB per core)	EW297AA
	Dual-Core AMD Opteron Processor Model 2218/ 2.60 GHz, 2 MB L2 cache (1 MB per core)	EW298AA
	Dual-Core AMD Opteron Processor Model 2220SE/ 2.80 GHz, 2 MB L2 cache (1 MB per core)	RM696AA
	Dual-Core AMD Opteron Processor Model 2222SE/ 3.00 GHz, 2 MB L2 cache (1 MB per core) - air cooled	RL861AV
	Dual-Core AMD Opteron Processor Model 2222SE/ 3.00 GHz, 2 MB L2 cache (1 MB per core) - liquid cooled	RL862AV

Graphics	Multi display solutions	Windows Vista	Windows XP	Red Hat Linux	Part Number
	NVIDIA Quadro NVS 285* PCIe (128 MB, VGA & DVI)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	RD069AA
	NVIDIA Quadro NVS 290* PCIe (256 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4	GN502AA
	NVIDIA Quadro FX 560* PCIe (128 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	ES354AA
	NVIDIA Quadro FX 570* PCIe (256 MB	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4	GR521AA
	NVIDIA Quadro FX 1500* PCIe (256 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	ES355AA
	NVIDIA Quadro FX 1700* PCIe (512 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4	GP529AA
	NVIDIA Quadro FX 3500* PCIe (256 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	ES357AA
	NVIDIA Quadro FX 4600* PCIe (768 MB)	Not supported	32-Bit, 64-Bit	WS 3, WS 4	RV706AA
	NVIDIA Quadro FX 5500* PCIe (1 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	RF089AA
	NVIDIA Quadro G-Sync Card**	Not supported	32-Bit, 64-Bit	WS 3, WS 4	ED087AA

NOTE: To run the accelerated graphics driver on RHEL3 U4, download the latest driver. Please refer to the Release Notes Chapter in http://www.hp.com/support/linux_user_manual.
*May use two graphics cards. Must use matching graphics cards and order a second processor. ** Only supported on NVIDIA Quadro FX 45xx and newer series graphics cards.

After-Market Options

Hard Drives	SATA Hard Drives	Windows Vista	Windows XP	Red Hat Linux	Part Number
	80 GB 7200 rpm SATA 3.0Gb/s Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	PY276AA
	160 GB 7200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	PV944A
	250 GB 7200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EA788AA
	500 GB 7200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	PV943A
	80 GB 10K rpm SATA NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM172AA
	160 GB 10K rpm SATA NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EW222AA
	SAS Hard Drives				
	146 GB 10K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM173AA
	73 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EA329AA
	146 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EA330AA
	300 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM174AA
	HP xw84/94 SAS Back Panel Connector Kit	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM164AA

NOTE: The RHEL3 U4 (x86) OS will operate correctly after some manual configuration steps. Please refer to the Release Notes Chapter in http://www.hp.com/support/linux_user_manual.

Controller cards		Windows Vista	Windows XP	Red Hat Linux	Part Number
	LSI 8344ELP 8-port SAS HW RAID Card		32-Bit, 64-Bit	Not supported	EX830AA
	IEEE 1394b FireWire 800 4-Port PCI Card (2 Ports 1394b & 1 Port 1394a)	Not supported	32-Bit, 64-Bit	Not supported	EA327AA

Input/Output Devices	Keyboards	Windows Vista	Windows XP	Red Hat Linux	Part Number
	HP PS/2 Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DT527A
	HP USB Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DT528A
	HP USB Smartcard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	ED707AA
	Pointing Devices				
	HP PS/2 2-Button Scroll Mouse (mechanical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DD440B
	HP USB 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DC172B
	HP USB 3-button Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DY651A
	HP USB 3-Button 2.9M OEM Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	ET424AA

After-Market Options

	HP SpacePilot 3D USB Intelligent Controller	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	EF390AA

Networking	NICs	Windows Vista	Windows XP	Red Hat Linux	Part Number
	Broadcom 5751 Netxtreme Gigabit PCIe Adapter	32-Bit, 64-Bit	32-Bit	WS 3, WS 4	EA833AA
	Intel Pro 1000 GT Gigabit PCI Express NIC	32-Bit, 64-Bit	32-Bi	WS 3, WS 4	AG393AA

Memory (DIMMs)		Windows Vista	Windows XP	Red Hat Linux	Part Number
	512 MB (1x 512 MB) PC2-5300P DDR2-667 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EV281AA
	1 GB (1x 1 GB) PC2-5300P DDR2-667 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EV282AA
	2 GB (1x 2 GB) PC2-5300P DDR2-667 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EV283AA
	4 GB (1x 4 GB) PC2-4200 DDR2-533 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	RP907AA

Monitors (Supported by all Operating Systems supplied by HP)	TFT displays	Part Number
	HP LP3065 30-inch Widescreen LCD Monitor	EZ320A4
	HP LP2465 24-inch Widescreen LCD Monitor	EF224A4
	HP LP2065 20-inch LCD Monitor	EF227A4
	HP L1965 19-inch LCD Monitor	RA373AA

Optical drives	DVD-ROM Drive	Windows Vista	Windows XP	Red Hat Linux	Part Number
	16X DVD-ROM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	AA620B
	Combo Drive				
	SATA 48X CD-RW/DVD-ROM Combo Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EW267AA
	DVD+/-RW Drive				
	SATA SuperMulti DVD+/-RW LightScribe*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EW269AA

* LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

After-Market Options

Removable Storage		Windows Vista	Windows XP	Red Hat Linux	Part Number
	HP 16-In-1 Media Card Reader with PCI Card	TBD	32-Bit, 64-Bit	Not supported	EM718AA
	HP 512 MB USB 2.0 Drive Key	TBD	32-Bit, 64-Bit	WS 3 & WS 4	ED516AA
	HP 1 GB USB 2.0 Drive Key	TBD	32-Bit, 64-Bit	WS 3 & WS 4	AG382AA
	1.44 MB Internal Floppy Drive	TBD	32-Bit	WS 3 & WS 4	DY670A
	HP StorageWorks DAT 40 USB external tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW023A
	HP StorageWorks DAT 40 USB internal tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW022A
	HP StorageWorks DAT 72 USB external tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW027A
	HP StorageWorks DAT 72 USB internal tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW026A
	HP StorageWorks DAT 160 USB external tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	Q1581A
	HP StorageWorks DAT 160 USB internal tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	Q1580A

Audio Card		Windows Vista	Windows XP	Red Hat Linux	Part Number
	Sound Blaster X-Fi XtremeMusic Audio Card	Not supported	32-Bit	Not supported	EA326AA
	HP USB Powered Stereo Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	32-Bit, 64-Bit	RD628AA
	HP Satellite Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	32-Bit, 64-Bit	ZD929AA

Security		Part Number
	HP Business PC Security Lock Kit	PV606AA
	HP 2006 Business PC Security Lock Kit	EV265AA
	Kensington Security Cable & Lock	PC766A

Rack kits / Chassis options		Part Number
	xw8000 Depth Adj Fixed Rail Rack Kit	AA640A
	HP xw8/9 Sliding Rail Rack Kit	DY664A
	HP xw8/9 Bulk 10 Pack PCI Hold Down Kit	EN764AA
	HP Internal USB Port Kit	EM165AA

After-Market Options

Software		Windows Vista	Windows XP	Red Hat Linux	Part Number
	HP Remote SW for HP 1year Update Subscription	TBD	32-Bit	Not supported	PN680A
	HP Remote SW Receiver 1year Update Subscription	TBD	32-Bit	Not supported	PN682A
	HP Remote Graphics SW V3 for HP Sys LTU	TBD	32-Bit	Not supported	PY682AA
	HP Remote Graphics SW V3 Receiver LTU	TBD	32-Bit	Not supported	PY684AA
	HP Remote Graphics SW V3 CD-ROM Media	TBD	32-Bit	Not supported	PY685AA
	HP ProtectTools Quantity 1 Software	TBD	32-Bit	Not supported	EM530AA
	HP ProtectTools Quantity 25 Software	TBD	32-Bit	Not supported	EM531AA
	HP ProtectTools Quantity 500 Software	TBD	32-Bit	Not supported	EM532AA

Mechanical Specifications

Form Factor	Minitower	
Color	Carbonite/Alloy metallic	
Expansion Slots (see mainboard section for additional details)	• 2 PCI Express (PCIe) x16 75W+EXT75W (Graphics) slots • 2 PCIe x16 (8,4,1) slots • Full-height PCI-X slots at 100 MHz, or 1 slot at 133 MHz, exclusive1 full-length PCI slot	
Bays (see storage section for additional details)	• Five 3.5 inch bays • Three 5.25 inch bays	
Front I/O	4 ports: 2 USB 2.0, 1 headphone, 1 microphone, 1 IEEE 1394	
Rear I/O	16 ports: 6 USB 2.0, 1 standard serial 9-pin port, 1 IEEE 1394, 1 PS/2 keyboard, 1 PS/2 mouse, 2 RJ-45 to integrated Gigabit LAN, 1 Audio In, 1 Audio Line Out, 1 Mic In, S/PDIF OUT coax	
USB Keyboard	Optional	
USB Mouse	Optional	
PS/2 Keyboard	1	
PS/2 Mouse	1	
Chassis Dimensions (H x W x D)	17.9 x 8.3 x 20.7 inches; 45.4 x 21.0 x 52.5 cm	
System Weight	Minimum config - 42 lb (19 kg) Standard config - 45 lb (20 kg) Maximum config - 54 lb (24 kg)	
Temperature	Operating	40° to 95° F (5° to 35° C)
	Non-operating	-40° to 140° F (-40° to 60° C)
Humidity	Operating	8% to 85%
	Non-operating	8% to 90%
Maximum Altitude (nonpressurized)	Operating	10,000 feet; 3,000 m
	Non-operating	30,000 feet; 9,100 m
Power Supply	800W wide-ranging, active Power Factor Correction	
Interfaces Supported	6 SATA interface (6 serial-ATA connectors), 8 SAS interface, 2 EIDE interface (1 EIDE connectors) supported for optical drives.	
Hard Drive Controller (SAS/SATA) Supported	Serial Attached SCSI (RAID 0, 1, IME) or SATA 3 Gb/s (RAID 0, 1, 5, 10)	

Cooling	
Power Supply Fan	3.62 x 0.98 inches; 92 x 25 mm
Processor Fan-Heatsink	3.15 x 0.59 inches; 80 x 15 mm
Memory Fan	2.75 x 0.59 inches; 70 x 15 mm
Chassis Fan (front)	One 3.15 x 0.98 inches; 80x 25 mm)
Chassis Fan (rear)	One 4.72 x 0.98 inches; 120 mm x 25 mm (standard)

Mechanical Specifications

Power Supply		
Power Supply	800 watt custom power supply - (Wide Ranging, Active PFC)	
Operating Voltage Range	90 - 269 VAC	
Rated Voltage Range	100 - 240 VAC	100 - 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 - 66 Hz	47 - 66 Hz
Rated Input Current	13.2A @ 100-120VAC 6.6 A @ 200-240VAC	13.2A @ 100-120VAC 6.6 A @ 200-240VAC
Heat Dissipation (Configuration and software dependent)	Typical 1950 btu/hr (491 kg-cal/hr) Maximum 3793 btu/hr (956 kg-cal/hr)	
Power Supply Fan	92x32 mm variable speed	
Blue Angel Compliant (<5W in S5 - Power Off)	N/A	
FEMP Standby Power Compliant @115V (<2W in S5 - Power Off, with Wake on LAN disabled)	NO	
Power Consumption in ES Mode - Suspend to RAM (S3) (Instantly Available PC)	< 10 W	

NVIDIA Nforce Professional 3000 Series

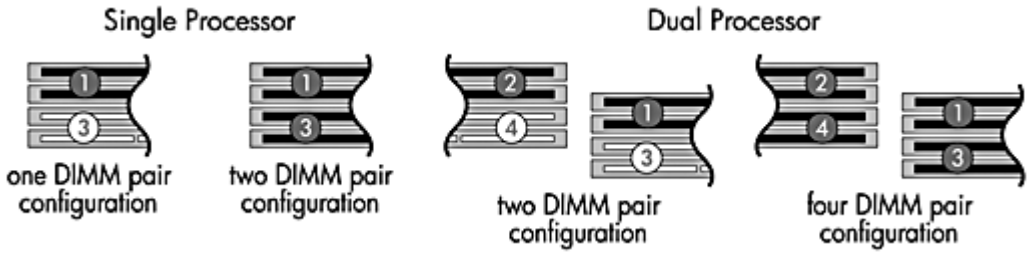
DDR2 SDRAM ECC REGISTERED MEMORY

This chart does not represent all possible memory configurations. Each AMD Opteron processor has an integrated memory controller that supports ECC Registered 667 MHz (PC2 5300P) DDR2 or ECC Registered 533 MHz (PC2 4200) DDR2 memory. Main memory is directly connected to the processor through the Direct Connect Architecture. There are 8 DIMM slots in total, with 4 DIMM slots per processor, each processor offering a memory bandwidth transfer rate up to 10.2 GB/s. Over 32 GB requires dual CPUs, and will require 8 GB DIMMS (when available).

Memory must be added in pairs. Match DIMM pairs by size and type. Use only HP tested and validated memory.

The memory sockets are laid out on the mainboard as below:

Memory configurations for the HP xw9400 Workstation:



In a single processor configuration, install the first DIMM pair in socket set 1 (blue sockets), and the 2nd DIMM pair in socket set 3 (black socket).

In a dual processor configuration, install the first DIMM pair in socket set 1 (blue sockets), the 2nd DIMM pair in socket set 2 (blue sockets) and, if required, the 3rd pair in socket set 3 (black sockets) and the 4th pair in socket set 4 (black sockets).

MAXIMUM MEMORY

Supports up to 64 GB of DDR2 SDRAM, in a configuration of 32 GB per processor (over 32 GB requires dual CPUs and Quad Ranked DIMMS when supported).

POSSIBLE MEMORY CONFIGURATIONS

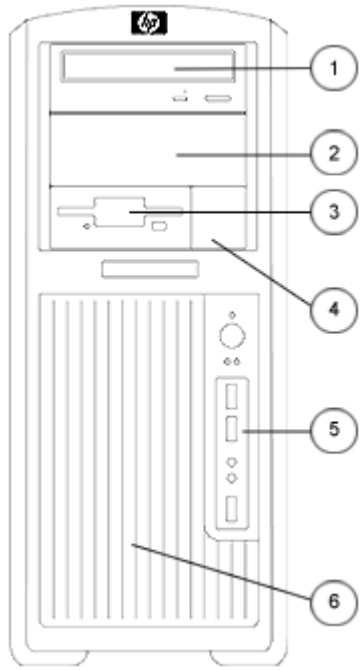
Not all memory configurations possible are represented below.

Memory

	CPU 1				CPU 2			
	Socket set 2		Socket set 4		Socket set 1		Socket set 3	
1 GB					512 MB	512 MB		
2 GB					1 GB	1 GB		
2 GB					512 MB	512 MB		
2 GB					512 MB	512 MB		
4 GB					1 GB	1 GB		
8 GB					2 GB	2 GB		
2 GB (dual)	512 MB	512 MB			512 MB	512 MB		
4 GB (dual)	1 GB	1 GB			1 GB	1 GB		
4 GB (dual)	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
6 GB (dual)	1 GB	1 GB	512 MB	512 MB	1 GB	1 GB	512 MB	512 MB
8 GB (dual	2 GB	2 GB			2 GB	2 GB		
8 GB (dual	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB
12 GB (dual)	2 GB	2 GB	1 GB	1 GB	2 GB	2 GB	1 GB	1 GB
16 GB (dual)	4 GB	4 GB			4 GB	4 GB		
16 GB (dual)	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB
32 GB (dual)	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB
64* GB (dual)	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB
* 64 GB sizes are expected to be available in Mid 2007.								

Storage

Tower configuration



Total Bays	8
Internal Bays	Five 3.5 inch bays (4 with acoustic rail assemblies)
External Bays	Three 5.25 inch bays - top two support full-depth (210 mm maximum) devices. Bottom bay is depth restricted to 169 mm (including cables). Bays can be converted to internal 3.5 inch drive bays using optional bracket Floppy drive bay using optional bracket. Consumes one 5.25 inch bay.

Minitower

	Quantity Supported	Position Supported	Controller
Optional Diskette Drive	1	3	Diskette
5.25" Storage Drive Bays	3	1, 2, 3	IDE
3.5" Storage Drive Bays with acoustic dampening rail assemblies	5	4, 5, 6, 7, 8	SATA or SAS

SCSI and SATA may be mixed in a Windows configuration; only the primary drive may be SATA. Linux does not support SATA controller or mixing SATA and SAS drives.

ROM Features	Description
Instantly Available PC	Allows for very low power consumption with quick resume time
ROM Based F10 Setup and Power-on Self Test	Review and customize BIOS settings
Remote System Installation via F12 (PXE) (remote boot from server)	Allows a new or existing system to boot over the network and download software, including the operating system
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS
ROM Revision Levels	Identifies system BIOS revision level and reports in ROM-based F10 setup. Version is stored in an industry standard memory location (SMBIOS) so that management SW applications can use and report this information
System Board Revision Level	Allows management SW to read the revision level of the system board Revision level is digitally encoded into the hardware and cannot be modified
Auto Setup when new hardware installed	System automatically detects addition of new hardware
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, parallel, USB, audio, and network ports
Removable Media Write/ Boot Control	Prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-on Password	Prevents an unauthorized person from booting up the workstation
Setup Password	Prevents an unauthorized person from changing the workstation configuration
Replicated Setup	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup
Memory Change Alert (requires HP Client Manager Software)	Alerts management console if memory is removed or changed
Thermal Alert (requires HP Client Manager Software)	Monitors the temperature state within the chassis. Three modes: • NORMAL - normal temperature ranges • ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown • SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup/Shutdown	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM
ACPI (Advanced Configuration and Power Interface)	• Allows the system to enter and wake from a low power mode • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system Supports ACPI 2.0 for full compatibility with 64-Bit operating system
Keyboard-less Operation	The system can be operated without a keyboard
SMBIOS	System Management BIOS 2.5, previously known as DMI BIOS, for system management information
Localized ROM Setup	Common BIOS image supports configuration (Setup) in 12 languages, with local keyboard mappings

Asset Tag	Allows user or MIS to set unique tag string in ROM
Ownership Tag	Allows user or MIS to set unique tag string in ROM
Memory Scrubbing	Allows memory controller to transparently correct transient ECC errors in the background
Memory Remapping	Allows system memory lost to PCI devices to be reclaimed above 4 GB, for use with operating systems that support more than 4 GB (Microsoft Windows XP 64-Bit edition, Linux)
Per-slot Control	Allows individual slot configuration (option ROM., latency)
Adaptive Cooling	Fan control parameters are set according to detected hardware configuration for optimal acoustics
Pre-boot Diagnostics	Early (pre-video) critical errors are reported via beeps and blinks on the power LED

Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 2.0c
ASF	Alert Standard Format Specification, Version 2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
BIOS 32-Bit Services	Standard BIOS 32-Bit Service Directory Proposal v0.4
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	• Enhanced Disk Drive Specification Version 1.1 • BIOS Enhanced Disk Drive Specification Version 3.0
PCI	• PCI Local Bus Specification, Revision 2.3 • PCI Power Management Specification, Revision 1.1
PCI Express	PCI Express Base Specification, Revision 1.0a
PMM	POST Memory Manager Specification, Version 1.01
SATA	• Serial ATA Specification, Revision 1.0a • Serial ATA 3.0Gb/s: Extensions to Serial ATA 1.5Gb/s, Revision 1.0
SAS	SAS specification 1.1
SMBIOS	System Management BIOS Reference Specification, Version 2.5
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
USB 1.1	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification

Other Deployment & Management Features	
HP Client Management Solutions	HP Client Management Solutions help simplify management of Workstations and significantly reduce total ownership costs. HP has two distinct client management product lines. The first client management product line consists of HP OpenView Configuration Management Solutions and HP OpenView Client Configuration Manager. The second client management product line is comprised of the HP Client Premium Suite, HP Client Foundation Suite, and HP Client Manager To learn more about all of these solutions, visit http://www.hp.com/go/easydeploy
HP Client Manager	HP Client Manager is available for free for use with all HP business PCs, Notebooks, and Workstations. It enables central tracking, monitoring, and management of the hardware aspects of HP client systems: • Get valuable hardware inventory information such as CPU, memory, video, and security settings • Monitor system health to fix problems before they occur • Install drivers and BIOS updates without visiting each PC

	• Remotely configure BIOS and security settings • Automate processes to quickly resolve hardware problems Additional Altiris solutions (fee-based) are available to address Workstation management challenges through the entire IT lifecycle including: • Inventory assessment • Software license compliance • Personality migration • Software image deployment • Software distribution • Asset management • Problem resolution Visit http://www.hp.com/go/clientmanager for more information, to download HP Client Manager, and to evaluate the Altiris solutions
System Software Manager (free)	A free utility that detects and updates BIOS, device drivers, and management agent versions on your networked PCs and workstations
HP Backup and Recovery Manager (included with PC)	HP Backup and Recovery Manager saves your computer's software image on Recovery Discs (CDs or DVDs). You have the flexibility to save both the original factory software image that came with your HP computer and your software image that includes your customizations and data. These Recovery Discs enable full recovery of your computer should a critical hardware failure occur. Since HP now provides this simple tool to create your own Recovery Discs, HP commercial PCs that include HP Backup and Recovery Manager will not include factory restore CDs. HP Backup & Recovery Manager is preloaded on new HP commercial desktops, workstations, notebooks, and tablet PCs introduced starting March 2006*. For product availability, visit http://www.hp.com/go/easydeploy. NOTE: *Up to 8 GB of the hard drive is reserved for the system recovery software.
Replicated Setup	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup
Asset Tag	• Repository for storing company-specific property asset numbers for easy tracking • Initially set equal to the system serial number • Stored in a protected section of non-volatile memory that can be accessed and modified with the F10 Setup program
DIMM Serial Presence Detect	Detects whether or not memory DIMMs are present and their type
Hard Drive Serial Number, Model, and Manufacturer	Hard drive manufacturer, model, and serial number is stored in the hard drive firmware and reported in ROM-based F10 setup
Memory Change Alert (Requires HP Client Manager)	Alerts management console if memory is removed or changed
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen
Protocol-level Integrity Monitoring	A feature of SATA and SAS, Cyclic Redundancy Checking provides command, data and message transfer verification and proactive notification of problems with recommendations for enhancing system performance. It detects all the following errors types: • single bit errors • double bit errors • an odd number of errors • error bursts up to 32-Bits long

Drive Self Tests (DPS)	• Drive Protection System • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures. DPS Access through F10 Setup during Boot (F10 diagnostic access not available with SCSI drives)
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count. By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure. SMART I - Drive Failure Prediction SMART II - Off-Line Data Collection SMART III - Off-Line Read Scanning with Defect Reallocation

Security Features	
Access Panel Key Lock (standard)	Prevents removal of the access panel and all internal components including optical and floppy drives
Padlock (optional)	Prevents entire system theft and discourages access panel removal. 7mm diameter padlock loop at rear of system.
Kensington Cable Lock (optional)	Prevents entire system theft only. 3mm x 7mm slot at rear of system.
Universal chassis clamp lock (optional)	The version without a cable discourages access panel removal and prevents theft of IO devices. The version with a cable additionally prevents entire system theft and allows multiple systems to be secured with a single cable.

HP ProtectTools Security Manager	HP ProtectTools Security Manager can be configured to prevent unauthorized access using Smart Cards, TPM Embedded security chips, USB tokens and other security technologies. HP ProtectTools Security Manager is completely customizable, which gives customers the flexibility to choose the level of security that best meets their needs.
	
	• Smart Card security for HP ProtectTools
	  ○ Initialization and configuration of the Smart Card
	  ○ Manage Smart Card accounts and security settings
	• Embedded Security for HP ProtectTools
	  ○ TPM Embedded Security Chip configuration and management
	• Credential Manager for HP ProtectTools
	  ○ Multifactor Windows Authentication
	  ○ Single sign-on
	• BIOS configuration for HP ProtectTools
	  ○ BIOS configuration and security settings from within the HP ProtectTools Security Manager console
	
	Visit http://h18004.www1.hp.com/products/security/ for more information on HP ProtectTools

Serviceability Features of System	
Access panel	Tool-less, one-handed

Technical Specifications

Optical drives	Tool-less
Floppy drive	Drive requires screws to attach to bracket, once attached to mounting bracket, it latches toollessly to chassis
Hard drives	Tool-less
Expansion cards	Tool-less
Green user touch points	Yes, on tool-free internal chassis mechanisms
Color-coordinated cables and connectors	Yes
Memory	Tool-less, can be upgraded without removing any internal components
CPUs	Tool-less, can be upgraded without removing any internal components
Chassis fan removal	Tool-less
Power supply diagnostic LED	Yes, dual function: AC OK & power OK
Power Button	Yes, ACPI multi-function
Power LED	Yes, dual color LED indicates normal operation and faults.
Hard drive activity LED	Yes
Internal speaker	Yes, used for pre-boot diagnostic beep codes
Dual Color Power and HD LED on Front of Computer (Indicates Normal Operations and Fault Conditions)	green – normal red – fault
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS.
Configuration Record SW	Yes
Over-Temp Warning on Screen (Requires IM Agents)	Yes
OS CD (Restore OS CD)	Restores computer to its original factory shipping Operating System
Restore CD	Restores the computer to its original factory shipping image
Flash ROM	Yes
3.3V Aux Power LED on System PCA	Yes
Dual Function 5V Aux Power LED (ON)/PS_ON LED (OFF) on System PCA	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder for easy Replacement	Yes
Processor ZIF Socket for easy Upgrade	Yes
DIMM Connectors for easy Upgrade	Yes

Technical Specifications

NIC LEDs (integrated) (Green & Amber)	Used to determine NIC status
ASF 1.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Dual function front power switch	Causes a fail-safe power off when held for 4 seconds

Service and Support	On-site Warranty and Service (Note 1): This three-year, limited warranty and service offering delivers three years of on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 8am - 5pm. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.
	NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.
	NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
	NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • US Federal Energy Management Program (FEMP) • China Energy Conservation Program • IT ECO declaration • Japan PC Green label*
	*NOTE: This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'

Longevity and Upgrading	This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include: • Dual AMD socket F (aka L1, 1207 pins) • 8 USB ports • 1 PCI slot, 2 PCI-X slots and 4 PCI Express slots • 8 expansion bays • 8 memory slots

Technical Specifications

Batteries	This product complies with ISO standards: • EU Directive 91/ 157/ EEC • EU Directive 93/ 86/ EEC • EU Directive 98/ 101/ EEC Batteries used in the product do not contain: • Mercury greater the 5ppm by weight • Cadmium greater than 10ppm by weight • Lead greater than 4000ppm by weight. Battery size: CR2032 (coin cell) Battery type: Lithium

System Configuration

Example Configuration #1	Processor Info	2xOpteron 2216 2.4GHz 1MB
	Memory Info	4x1GB 667MHz
	Graphics Info	FX1500 256MB
	Disks/Optical/Floppy	1x80GB SATA / 2 Optical / 1 Floppy

Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	207W		204W		208W	
	Windows Busy Typ(S0)	258W		256W		264W	
	Windows Busy Max (S0)	336W		333W		343W	
	Sleep (S3)	6.5W	6.1W	6.5W	6.3W	6.2W	6.0W
	Off (S5)	3.3W	3.1W	3.6W	3.2W	3.1W	2.8W

Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	706 btu/hr		645 btu/hr		710 btu/hr	
	Windows Busy Typ (S0)	882 btu/hr		872 btu/hr		899 btu/hr	
	Windows Busy Max (S0)	1145 btu/hr		1138 btu/hr		1170 btu/hr	
	Sleep (S3)	22.2 btu/hr	20.8 btu/hr	22.2 btu/hr	21.5 btu/hr	21.2 btu/hr	20.5 btu/hr
	Off (S5)	11.3 btu/hr	10.6 btu/hr	12.9 btu/hr	10.9 btu/hr	10.6 btu/hr	9.6 btu/hr

NOTES:
* Energy Star low energy mode
** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.
This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.

Declared Noise Emissions (High and entry level configurations)			
System Configuration (Entry-level)	The entry-level configuration used for the Declared Noise Emissions for the Mini tower Desktop model is based on a "Typically Configured Desktop"		
	Processor Info Disks/Optical/Floppy	2x 2.4 GHz AMD Opteron processors 1x 80 GB 7200 rpm SATA / 1 DVD-ROM/ 1 Floppy	
	Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		
		Sound Power (LWad, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.4 Bels	26 dB
	SATA Hard drive Operating (random reads - 30.3 reads/sec)	4.4 Bels	26 dB
	Floppy Drive Operating (continuous copy)	4.8 Bels	32 dB
	DVD-ROM Operating (sequential reads)	5.0 Bels	33 dB
System Configuration (High-end)	The high-end configuration used for the Declared Noise Emissions for the Mini tower Desktop model is based on a "Typically Configured Desktop"		
	Processor Info Graphics Info Disks/Optical/Floppy	2x 2.8 GHz AMD Opteron processors Quadro FX 3500 with active heatsink 1x 72 GB 15K rpm SAS / 1 DVD-ROM / 1 Floppy	
	Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		
		Sound Power (LWad, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.5 Bels	26 dB
	SATA Hard drive Operating (random reads - 30.3 reads/sec)	4.9 Bels	33 dB
	Floppy Drive Operating (continuous copy)	4.8 Bels	32 dB
	DVD-ROM Operating (sequential reads)	5.0 Bels	34 dB
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043. • This product contains 0% recycled materials (by wt.) • This product is >90% recycle-able when properly disposed of at end of life.		
	Packaging Materials		
	External	Cardboard carton and insert	2.70 kg
	Internal	LDPE Foam	0.35 kg

Technical Specifications

Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html): • Asbestos • Certain Azo Colorants • Certain Brominated Flame Retardants - may not be used as flame retardants in plastics • Cadmium • Chlorinated Hydrocarbons • Chlorinated Paraffins • Formaldehyde • Halogenated Diphenyl Methanes • Lead carbonates and sulfates • Lead and Lead compounds • Mercuric Oxide Batteries • Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user. • Ozone Depleting Substances • Polybrominated Biphenyls (PBBs) • Polybrominated Diphenyl Ethers (PBBEs) • Polybrominated Biphenyl Oxides (PBBOs) • Polychlorinated Biphenyl (PCB) • Polychlorinated Terphenyls (PCT) • Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications. • Radioactive Substances • Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-Of-Life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: [link to new HP white paper now in progress] Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

Technical Specifications - Audio

High Definition Integrated Realtek ALC262 Audio	Type	Integrated
	High Definition Codec	Yes
	SPDIF	S/PDIF OUT through Coax port, S/PDIF IN on PCA, S/PDIF OUT header on PCA.
	External audio jacks	One Front Stereo Analog Microphone-In One Front Stereo Headphone-Out One Rear Line-In One Rear Line-Out One Rear Stereo Analog Microphone-In
	Retasking	NOTE: All audio ports are retaskable as Line-In, Line-Out, Microphone-In, or Headphone-Out
	Sampling	44.1 kHz/48 kHz/96 kHz/192 kHz (output only)
	Wavetable syntheses (software)	Yes - Uses OS soft wavetable
	Digital audio	Yes
	Analog audio	Yes
	Number of channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal audio speaker power rating	1.5 W
	Internal speaker	Yes
	Microphone features	Acoustic Echo Cancellation Noise Suppression Beam Forming
SoundBlaster X-Fi XtremeMusic Audio Card	Audio Quality	Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter) = 0.004%
	Signal to Noise Ratio (SNR)	Signal-to-Noise Ratio (20kHz Low-pass filter, A-Weighted) Stereo Output: 109dB Front and Rear Channels: 109dB Center, Subwoofer and Side Channels: 109dB
	Sound Conversion	24-bit Analog-to-Digital conversion of analog inputs at 96kHz sample rate 24-bit Digital-to-Analog conversion of digital sources at 96kHz to analog 7.1 speaker output 24-bit Digital-to-Analog conversion of stereo digital sources at 192kHz to stereo output
	Recording/Sampling Rate	16-bit to 24-bit recording sampling rates: 8, 11.025, 16, 22.05, 24, 32, 44.1, 48 and 96 kHz
	ASIO 2.0 support	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz 24-bit/48kHz and 24-bit/96kHz with direct monitoring
	Enhanced SoundFont support	up to 24-bit resolution 24-bit/96kHz

Technical Specifications - Audio

DACs	24-bit/192kHz	
Voice Support	128 voices	
Max. Channels in 3D Positional Audio	7.1	
EAX® ADVANCED HD™ 5.0 support	Yes including EAX® MacroFX™, EAX® PurePath™ and Environment FlexiFX™	
Connectors	FlexiJack (Performing a 3-in-1 function, Digital In / Line In / Microphone) via 3.50 mm minijack	
	Line level out (Front / Rear / Center / Subwoofer / Rear Center) via 3.50 mm minijacks	
	AUX_IN line-level analog input via 4-pin Molex connector on card	
	One AD_Link (26 pin) connector for linking to the X-Fi I/O Console (upgrade option)	
Dimensions	7.25" x5" x .9" (18.415 x 12.7 x 2.286 cm)	
Additional product features	Movies	THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback
	Music	X-Fi 24-bit Crystalizer CMSS-3D SuperRip
	Audio Creation	Pristine audio playback quality with a near transparent SRC engine Up to eight 24 bit hardware effects ASIO recording with latency as low as one millisecond 24-bit SoundFont® sampling 3D MIDI
Minimum System Requirements	System RAM	256 MB
	Hard Disk	600MB free space Available PCI 2.1 slot for the audio card CD-ROM/CD-RW or CD/DVD-ROM required for software installation
	Operating System	Microsoft Windows XP Service Pack 2 (SP2)

Technical Specifications - Communications

Integrated NVIDIA LAN-on-Motherboard	Connector	RJ-45
	Controller	NVIDIA Gigabit Controller with Marvell PHY
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3-2000
	Bus architecture	Integrated plus RGMII interface
	Data transfer mode	DMA
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power requirement	1.5 watts @ +3.3V AUX supply
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T, 1000 Mbps
	Operating system driver support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows NT® 4.0, Microsoft Windows 98, Microsoft Windows 2000, Microsoft Windows XP, Linux 2.2, Linux 2.4
	Management capabilities	WOL, PXE and NVIDA control console
Intel Pro/1000 GT Gigagit NIC (PCIe)	Connector	RJ-45
	Controller	Intel 82541PI Gigabit Controller
	Memory	Integrated 64 KB
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI 2.3
	Data path width	32-Bit PCI
	Data path speed	32 bit 33/66 MHz - 266 Mb/s full duplex
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC class , BSMI B for Taiwan, VCCI B for Japan
	Power requirement	800 mA @ +5 VDC
	IEEE support	802.2 and 802.3ab
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 1000BASE-T, 1000 Mbps
	Environmental	Operating temperature 32° to 131° F (0° to 55° C) Operating humidity 85% at 131° F (55° C)
	Dimensions	4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x .2 cm
	Operating system driver support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4

Technical Specifications - Communications

	Management capabilities	ACPI, Wake on LAN, Preboot Execution Environment, WfM Baseline v2.0, DMI 2.0 support, Windows Management Instrumentation, SNMP-manageable Offline Diagnostics, Intel Boot Agent
	Kit contents	IEEE 802.1Q Virtual Local Area Network (VLANs), IEEE 802.3x Flow Control, Transmission Control Protocol (TCP), Checksum Offload, IEEE 802.1p, Intel Priority Packet II.
Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe)	Connector	RJ-45
	Controller	Broadcom 5751 PCI-E 1.0a LAN Controller
	Memory	Integrated 96Kb frame buffer memory
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI-E 1.0a
	Data path width	X1
	Data path speed	2.5Gbit per sec per direction transfer rate
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC class B, NRTL Mark Canada and United States, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia
	Power requirement	3.1 watts @ +3.3V AUX supply
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T, 1000 Mbps
	Environmental	Operating temperature 32° to 131° F (0° to 55° C) Operating humidity 85% at 131° F (55° C)
	Dimensions	4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x 0.2 cm
	Operating system driver support	Microsoft Windows 2000 and XP, Red Hat Linux 7.2, 7.3 and Red Hat Enterprise Linux 3
	Management capabilities	WOL, PXE , Remote cable management
	Alerting	ASF 2.0
	Kit contents	Broadcom 5751, CD, Broadcom 5751 Netxtreme Gigabit PCIe NIC, drivers, quick install guide, product warranty statement

Technical Specifications - Controllers

LSI SAS 8344ELP 3Gb/s RAID Controller	PCI Bus	PCI-Express x4 lanes	
	PCI Modes	Bus Master DMA	
	RAID Levels	0, 1, 5, 10 and 50	
	PCI data burst transfer rate	1.0 GBps (half duplex) 2.0 GBps (full duplex)	
	SAS Bandwidths	**Half Duplex** Single lane - 300 MBps Wide Port (2 lanes) - 600 MBps Wide Port (4 lanes) - 1200 MBps	**Full Duplex** Single SAS Lane - 600 MBps Wide Port (2 lanes) -1200 MBps Wide Port (4 lanes) - 2400 MBps
	PCI Card Type	3.3 volt add-in card	
	PCI Voltage	12 V ± 10%	
	PCI Form Factor	6.6" x 2.731" (Low-profile)	
	PCI Power	7.5 Watts	
	Bracket	Full height and Low-profile	
	Certification Level	PCI-Express 1.0a	
	IO Bus	Eight 3Gbps SAS/SATA ports	
	SAS Processor	Intel IOP333 I/O Processor	
	Internal Connectors	One SAS SFF8087 x4 internal connector	
	External Connectors	One SAS SFF8470 x4 external connector	
	Max. Number of SAS Devices	32	
	LED Indicators	On-board activity and fault LEDs	
	Integrated Mirroring	Integrated Mirroring option available	
	Environments	Operating	Storage
	Temperature	0 to 60 C	-45 to +105 C
	Relative Humidity	5 to 90% non-condensing	5 to 90% non-condensing
	MTBF	>200,000 hours	
	Compliances	EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04);Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Safety: EN60950	
	Operating system support	Microsoft® Windows® XP Professional, XP Professional x64 Red Hat Linux WS3 and WS4	
	Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.	

* Due to the placement of the I/O controller engine on the SAS 8344ELP, external cables from the SAS 8344ELP RAID controller to the storage enclosure may not be longer than two meters; this card also does not support the use of external fan-out cables. See http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?lang=en&cc=us&objectID=c00817918&jumpid=reg_R1002_USEN for additional information

Technical Specifications - Controllers

LSI SAS3041E Serial Attach SCSI (SAS) Host Bus Adapter (HBA)	PCI Bus	PCI-Express x4 lanes	
	PCI Modes	Bus Master DMA	
	PCI data burst transfer rate	1.0 GBps (half duplex) 2.0 GBps (full duplex)	
	SAS Bandwidths	Half Duplex Single lane – 300 MBps Wide Port (2 lanes) – 600 MBps Wide Port (4 lanes) – 1200 MBps	Full Duplex Single SAS Lane – 600 MBps Wide Port (2 lanes) – 1200 MBps Wide Port (4 lanes) – 2400 MBps
	PCI Card Type	3.3 volt add-in card	
	PCI Voltage	12 V ± 10%	
	PCI Form Factor	6.6" x 2.731" (Low-profile)	
	PCI Power	7.5 Watts	
	Bracket	Full height and Low-profile	
	Certification Level	PCI-Express 1.0a	
	IO Bus	Four 3Gbps SAS / 1.5Gps SATA ports	
	SAS Processor	LSISAS1064E	
	Internal Connectors	Four- SATA x1 connectors	
	External Connectors	None	
	Max. Number of SCSI Devices	128	
	LED Indicators	On-board activity and fault LEDs	
	Integrated Mirroring	Integrated Mirroring option available	
	Environments	Operating	Storage
	Temperature	32° to 140° F (0° to 60° C)	-49° to +221° F (-45° to +105° C)
	Relative Humidity	5% to 90% non-condensing	5% to 90% non-condensing
	MTBF	>200,000 hours	
	Compliances	EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04);Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Safety: EN60950	
	Operating system support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, XP Professional x64, Red Hat Enterprise Linux 4 & 5 Desktop	
	Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.	

Technical Specifications - Controllers

Adaptec SCSI RAID 2120S Card	Dimensions (H x D)	2.5 x 6.6 inches; 6.4 x 16.8 cm Low profile card
	RAID level	0, 1, 10, 5, 50, JBOD
	Data Transfer Rate	Up to 320 MB/s
	Cache Memory	64 MB (onboard)
	Device Support	Up to 15 SCSI devices
	Bus Type	64-bit/66 MHz PCI
		(Also support 32-bit/33 MHz PCI)
	Internal Connectors	One 68-pin high-density
	External Connectors	One 68-pin VHDCI
	System Requirements	Intel PC or equivalent with available PCI slot
	Operating Temperature	32° to 131° F (0° to 55° C)
	Power Requirements	4 amps @ +5V
	Operating System Support	Windows 2000 Professional, Windows XP Professional, Windows XP Professional x64 Edition
	Other	Optimized disk utilization
		Online RAID Level Migration
		Online capacity expansion
		Immediate RAID availability (background initialization)
		S.M.A.R.T. support
	Kit Contents	Controller card, driver CD, LED cables, user documentation and warranty card.

Serial ATA Hard Drives	750 GB (7,200 rpm)	Capacity	750,156,374,016 bytes	
		Height	1 inches; 2.54 cm	
		Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
		Cache	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.8 ms
			Average	14.0 ms
			Full-Stroke	20 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	1,465,149,168	
		Operating Temperature	41° to 131°F (5° to 55°C)	
	500 GB (7,200 rpm)	Capacity	500,107,862,016 bytes	
		Height	1 inches; 2.54 cm	
		Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
		Cache	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	1.3 ms
			Average	20.0 ms
			Full-Stroke	30 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131°F (5° to 55°C)	

Technical Specifications - Hard Drives

250 GB (7,200 rpm)	**Capacity**	250,059,350,016 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s) Native Command Queuing enabled (Model EA788AA only)	
	Synchronous Transfer Rate (Maximum)	Up to 3.0 Gb/s	
	Cache	With NCQ (Model EA788AA):16 MB Without NCQ (Model PY278AA): 8MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
		Average	18.5 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	
	Operating Temperature	41° to 131°F (5° to 55°C)	

160 GB (7,200 rpm)	**Capacity**	160,041,885,696 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
		Average	9.3 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131°F (5° to 55°C)	

Technical Specifications - Hard Drives

80 GB (7,200 rpm)	**Capacity**	80,026,361,856 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 3 Gb/s	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	2 ms
		Average	9.3 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131°F (5° to 55°C)	

160 GB (10k rpm)	**Capacity**	160,041,885,696 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 1.5 Gb/s	
	Cache	16 Mbytes	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 ms
		Average	4.6 ms
		Full-Stroke	10.2 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131°F (5° to 55°C)	

Technical Specifications - Hard Drives

80 GB (10k rpm)	Capacity	80,026,361,856 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 1.5 Gb/s	
	Cache	16 Mbytes	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.3 ms
		Average	4.6 ms
		Full-Stroke	10.2 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131°F (5° to 55°C)	

Serial Attached SCSI (SAS) Hard Drives 300 GB (15K rpm)	Capacity	300,000,000,000 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.2 ms
		Average	3.5 ms
		Full-Stroke	7.0 ms
	Rotational Speed	15,000 rpm	
	Logical Blocks	585,937,500 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	

146 GB (15K rpm)	**Capacity**	146,815,737,856 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.27 ms
		Average	3.5 ms
		Full-Stroke	7.4 ms
	Rotational Speed	15,000 rpm	
	Logical Blocks	286,749,488 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	
73 GB (15K rpm)	**Capacity**	73,407,865,856 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.2 ms
		Average	3.5 ms
		Full-Stroke	7.4 ms
	Rotational Speed	15,000 rpm	
	Logical Blocks	143,374,738 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	
300 GB (10K rpm)	**Capacity**	300,000,000,000 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	.3 ms
		Average	<4.5 ms
		Full-Stroke	<11.0 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	585,937,500 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	

Technical Specifications - Hard Drives

146 GB (10K rpm)	**Capacity**	146,815,737,856 bytes	
	Height	1.0 inches; 25.4 mm	
	Width	4.0 inches; 101.6 mm	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.3 msec
		Average	<4.5 msec
		Full-Stroke	<11.0 msec
	Rotational Speed	10,000 rpm	
	Logical Blocks	286,749,488 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	

Technical Specifications - Removable Storage

HP USB 2.0 Drive Key	Dimensions (HxWxD)	0.9 x 0.7 x 3.9 in (2.3 x 1.8 x 9.8 cm)
	Weight	0.05 lb (0.02 kg)
	USB Specification	2.0
	Transfer Rate	Read-1023 KB/Sec; Write-850 KB/Sec
	Storage Media	Solid state flash memory, no moving parts
	Power Supply	USB Bus-powered, no external power required
	Capacity	512 MB or 1 GB

FireWire 4-Port PCI Card (Windows XP only)	Host Bus Burst Data Rate	800 Mbps	
	Devices Supported	IEEE-1394 compliant devices	
	Bus Interface	PCI	
	Physical	PCI card with brackets for full height PCI slots.	
	Environmental	Operating temperature	50° to 131° F (10° to 55° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Relative humidity	20% to 80%
	Ports	Two IEEE 1394b bilingual 9-pin Connectors (Rear)	
	Connectors	One 10-Pin (9 Contacts) Custom Connector (Internal) to front panel IEEE-1394a 6-pin connector	
	Minimum System Requirements	Microsoft Windows XP Professional, Windows XP Home Pentium III or higher 128-MB RAM 1-GB Hard Drive CD-ROM drive Built-in sound system Available PCI slot	

PS/2 OR USB Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 inches; 45.8 x 16.3 x 2.5 cm
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		MicrosoftPC 99 - 2001	Functionally compliant
	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 feet; 1.8 m
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)

		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 inches; 66 cm on carpet, six-drop sequence
		Drop (in box)	42 inches; 107 cm on concrete, 16-drop sequence
	Operating system support		Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 3 and 4
	Approvals		UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
	Ergonomic compliance		ANSI HFS 100, ISO 9241-4, and TUVGS
	Kit contents		Keyboard, keyboard software media, installation guide, warranty card, safety and comfort
HP USB Smart Card Keyboard	Smart card compatibility	HP	HP ProtectTools Smart Card
		American Express	Amex Blue
		Axalto (Schlumberger)	Cryptoflex 8K Cryptoflex 16K Cryptoflex 32K Cryptoflex 32K e-gate Cyberflex Access 64K Cyberflex Access 32K Cyberflex 32K e-gate Cyberflex 64K Cyberflex Palmera Payflex-S Payflex 1K Payflex 2K Payflex 4K Payflex 8K Prismera US DoD CAC
		Cardlogix	CLXSU004KK4 CLXSU008KK5
		Safenet, Inc.	Model 300 Model 330
		De La Rue	VisaCash
		Gemplus	Gem Expresso GKK32K Gemclub Memo GemClub Micro GemXplore GemSafe
		Infineon	SLE66C322P
		SafLink (Litronic)	Forte

	Sharp	Java Card
	Oberthur	CosmopolIIC v4 CosmopolIIC v4.1 Cosmo ID-One GalatIIC v2.1 US DoD CAC
Memory Cards	Atmel	AT24C01ASC AT24C02SC AT24C04SC AT24C08SC AT24C16SC AT24C32SC AT24C64SC AT24C128SC AT24C256SC AT24C512SC AT88SC153 AT88SC1608
	Axalto (Schlumberger)	PrimeFlex Store 8K PrimeFlex Store 2K
	nfineon	SLE4406 SLE4406E SLE4406E SE SLE4418 SLE4428 SLE4432 SLE4436E SLE4442 SLE5536
	ISSI	IS23SC4418 IS23SC4428
	ST	14C02
	Telefonkarte	SLE4406 SLE4436 SLE5536
	XICOR	X24026

Technical Specifications - Input/Output Devices

HP 2-Button Scroll Mouse (PS/2)	Scroll Wheel	8 mm	
	Maximum Rotation Speed	30 mm/s	
	Switch Type	Light force micro-switch	
	Switch Life	1 million operations	
	Mechanical Life	Minimum 200,000 revolutions	
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, 6 surfaces
		Non-operating shock	80 g, 6 surfaces
		Operating vibration	2 g peak acceleration
		Non-operating vibration	4 g peak acceleration
	Electrical	Operating voltage	5 VDC ± 10%
		Power consumption	15 mA
		System consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge
		EMI-RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC99 - 2001	Functionally compliant
	Mechanical	Resolution	400 ± 20% DPI
		Tracking Speed	10 in/s maximum
		Acceleration	100 in/s
		Switch Actuation	85 g nominal peak force
		Switch Life	1,000,000 operations (using Hasco modified tester)
		Cable Length	2 m
		PC98-99	Mechanically compliant
	Regulatory Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BCIQ, C-Tick	

HP 2-button Optical Scroll Mouse (USB)	Dimensions (H x L x W)	1.5 x 4.5 x 2.5 inches; 3.8 x 11.6 x 6.3 cm
	Weight	0.27 lb (0.12 kg)
	Cable length	72.8 inches; 185 cm
	System requirements	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 3 and 4

Technical Specifications - Input/Output Devices

HP Optical 3-Button Mouse (USB)	Dimensions/Weight	Height	1.5 inches; 3.76 cm
		Length	4.5 inches; 11.56 cm
		Width	2.4 inches; 6.19 cm
		Weight	3.80 oz (108 g)
	Environmental	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating temperature	-4° to 140° F (-20° to 60° C)
		Operating humidity	10% to 90% (non condensing at ambient)
	Mechanical	Tracking speed	6 in/s Maximum
		Switch life	3,000,000 operations
		Switch type	Micro-switches
		Tracking mechanism life	155 miles (250 km) at average speed of 10 in/s
		Cable length	9.5 feet; 2.9 m
HP SpacePilot USB (Windows XP only)	Physical Characteristics	Dimensions (L x W x H)	9.3 x 5.6 x 2.0 inches; 236 x 143 x 53 mm
		Weight	1.875 lb (0.85 kg)
		Palmrest	Sculpted
	Mechanical	Buttons	21+ programmable speed keys 15 reprogrammable
		LCD Viewing Area	(W x H) 4.0" x 1.0" (102.4 x 30.2mm)
		Active Area	(W x H) 3.7" x 1.0" (93.4 x 26.2mm)
		Display Format	240 x 64
		Motion Controller	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		Device Sensitivity	Adjustable to preference
	Connector	USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows XP	
	Regulatory Approvals	FCC, CE	

Technical Specifications - Optical Devices

HP 48X SATA CD-RW/DVD-ROM Combo Drive	Form Factor	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	
	Write speed	CD-R	Up to 48X
		CD-RW	Up to 32X
	Read speeds	DVD+R/-R/+RW/-RW/+R DL /-R DL	Up to 8X
		DVD-ROM	Up to 16X
		CD-ROM, CD-R	Up to 48X
		CD-RW	Up to 32X
	Buffer Size	1.5MB (Min)	
	Access times (typical reads, including setting)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)
		Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Power	Source	SATA DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum
		Total Drive Power (standby mode)	< 2.5 Watt
	Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
	Operating Systems Supported	Windows Vista Business 64* (64-bit expected availability in July 2007), Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*, Red Hat Linux WS 4, 32/64-bit OS. No driver is required for this device. Native support is provided by the operating system. * Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit http://www.windowsvista.com/systemrequirements.	
	Option kit contents	HP 48X Max SATA CD-RW/DVD-ROM Combo Drive, Roxio Easy Media Creator version 9, Intervideo WinDVD, CD-R media, high-speed CD-RW media, and installation guide.	

HP 16X Max SATA DVD+/-RW LightScribe Drive	Form Factor	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Disc capacity	8.5 GB DL or 4.7 GB standard	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	
	Write speed	DVD+R	Up to 16X
		DVD+RW	Up to 8X
		DVD+R DL	Up to 8X
		DVD-R DL	Up to 4X
		DVD-R	Up to 16X
		DVD-RW	Up to 6X
		DVD-RAM	Up to 12X
		CD-R	Up to 48X
		CD-RW	Up to 32X
	Read speeds	DVD-RAM	Up to 12X
		DVD+RW, DVD-RW, DVD+R DL, DVD-R DL	Up to 8X
		DVD-ROM, DVD+R, DVD-R	Up to 16X
		CD-ROM, CD-R	Up to 48X
		CD-RW	Up to 32X
	Access times (typical reads, including setting)	Random	DVD: < 130 ms (typical), CD: < 120 ms (typical)
		Full Stroke	DVD: < 240 ms (seek), CD: < 200 ms (seek)
	Power	Source	SATA DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum
		Total Drive Power (standby mode)	< 2.5 Watt
	Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
	Operating Systems Supported	Windows Vista Business 64* (64-bit expected availability in July 2007), Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*, Red Hat Linux WS 4, 32/64-bit OS. No driver is required for this device. Native support is provided by the operating system.	

	* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit http://www.windowsvista.com/upgradeadvisor. For Windows Vista system requirements, visit http://www.windowsvista.com/systemrequirements.
Option kit contents	HP 16X DVD+-RW SuperMulti LightScribe drive, LightScribe software, Roxio Easy Media Creator version 9, Intervideo WinDVD Software, installation guide, and DVD+R media. Software is Microsoft Windows only.

Technical Specifications - Graphics

NVIDIA Quadro NVS 285, 128 MB PCIe - Dual Head (RD069AA)	Form Factor	Low profile, both ATX and low profile brackets included
	Graphics Controller	Integrated Quadro 285 2D graphics processor unit (GPU)
	Bus Type	PCIe
	RAMDAC	Dual 350 MHz (integrated)
	Memory	128 MB DDR
	Connector	DVI DMS-59 to dual DVI Y-cable and DMS-59 to dual-VGA Y-cable
	Dimensions	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)
	Controller clock speed	250 MHz
	Color depth	32 bits/pixel max
	Overlay planes	One 16-bit Video overlay plane
	Maximum pixel clock	350 MHz
	Multi-monitor support	Dual analog or digital monitors
	Single DVI Support	Yes
	Dual DVI Support	Yes
	High-definition Video Processor (HDVP)	Full screen, full frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	Available graphics drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode) HP qualified drivers may be preloaded or available from the HP support Web site: http://www.hp.com/country/us/en/support.html?pageDisplay=drivers

NVIDIA Quadro NVS 290, 256 MB Dual Head	Form Factor	Low Profile
	Bus Type	PCIe x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connector	DMS-59, includes DMS-59 to Dual DVI-I cable. DMS-59 to Dual VGA cable available as an option.
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Integrated dual 400MHz
	Color planes	32-bit color buffer
	Overlay planes	Hardware supported
	nView architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.
	Multi-Monitor support	Dual monitor support

	DVI support	DMS-59 (to dual DVI-SL)
	High-definition Video Processor (HDVP)	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	Supported graphics APIs	OGL 2.1 & DX10 Support; Shader Model 4.0
	Available graphics drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode), Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
NVIDIA Quadro FX 560 PCIe graphics controller (ES354AA)	Form Factor	ATX
	Graphics Controller	NVIDIA NV73GL
	Bus Type	PCI Express x16
	Memory	128MB 600MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 DVI-I (one dual-link) + 9-pin HDTV output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). HD-Out component Mode: YPrPB - SMPTE 1080i, 720p, 480p, 576p or composite Mode: NTSC/PAL 480i, 576i NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Dual 400MHz integrated
	Architecture features	128-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo

	Shading architecture	Fully programmable GPU Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported graphics APIs	OpenGL 2.0 DirectX 9.0
	Available graphics drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
NVIDIA Quadro FX 570 PCI-Express graphics controller	Form Factor	ATX
	Bus Type	PCI-Express x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DVI-I (dual-link) and DVI-I (dual-link)
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Integrated dual 400MHz
	Architecture features	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerrated pixel readback 3rd generation occlusion culling AA on scan-out
	Power consumption	<60 W
	Shading architecture	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	Supported graphics APIs	OGL 2.1 & SM4.0 and DirectX10 Support
	Available graphics drivers	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html.

Technical Specifications - Graphics

NVIDIA Quadro FX 1500 PCIe graphics controller (ES355AA)	Form Factor	ATX
	Graphics Controller	NVIDIA NV71GL
	Bus Type	PCI Express x16
	Memory	256MB GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 9-pin HDTV output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). HD-Out component Mode: YPrPB - SMPTE 1080i, 720p, 480p, 576p or composite Mode: NTSC/PAL 480i, 576i NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Dual 400MHz integrated
	Architecture features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz)
	Shading architecture	Fully programmable GPU Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported graphics APIs	OpenGL 2.0 DirectX 9.0
	Available graphics drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.

Technical Specifications - Graphics

NVIDIA Quadro FX 1700 PCI-Express graphics controller	Form Factor	ATX
	Bus Type	PCI Express x16
	Memory	512 MB 400 MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DVI-I (dual-link) and DVI-I (dual-link) and HD-out
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Integrated dual 400MHz
	Architecture features	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
	Power consumption	<75 W
	Shading architecture	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	Supported graphics APIs	OGL 2.1 & SM4.0 and DirectX10 Support
	Available graphics drivers	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html.

NVIDIA Quadro FX 3500 PCIe graphics controller (ES357AA)	Form Factor	ATX
	Graphics Controller	NVIDIA NV71GL-U
	Bus Type	PCI-Express x16
	Memory	256MB 700MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 3-pin Mini DIN stereo output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®

Technical Specifications - Graphics

	Maximum Resolution	Dual DVI-I output - drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 75Hz each
	RAMDAC	Dual 400MHz integrated
	Architecture Features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz) SLI Link
	Shading Architecture	Fully programmable GPU (OpenGL 2.0/DirectX 9.0c class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
	Available Graphics Drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
	Maximum Resolution	Dual DVI-I output - drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 75Hz each

NVIDIA Quadro FX 4500 PCIe, 512 MB (EA762AA) and optional G-Sync Card (ED087AA	Graphics controller	NVIDIA Quadro FX 4500 Workstation GPU
	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	512 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	Display resolution support	Dual integrated display controllers supporting up to 2048x1536 @ 75Hz (analog) or 3840x2400 @ 41Hz (digital) on both displays
	NVIDIA Quadro FX 4500 architecture	256-bit memory interface 35.2GB/sec. memory bandwidth

	Full 128-bit floating point color precision 12-bit subpixel precision 65,536 fragment instruction 65,536 vertex instruction 3D volumetric textures Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL® overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes Hardware two-sided lighting 3rd-generation occlusion culling OpenGL quad-buffered stereo Hardware-Accelerated Pixel Read-Back
Shading Architecture	16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
High Level Shader Languages	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
High-Resolution Antialiasing	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
Display Resolution Support	Dual Dual Link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 41Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each
nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
Optional G-Sync	Delivers Frame lock/Genlock functionality to unprecedented levels of industrial realism, visualization and collaborative capabilities. Frame lock allows the display channels from multiple workstations to be synchronized, thus creating one large "virtual display" that can be driven by a multisystem cluster for performance scalability, while Genlock allows the graphics output to be synchronized to an external source, typically for film and broadcast video applications. The NVIDIA Quadro G-Sync requires an NVIDIA Quadro FX 4500 graphics controller and an available expansion slot.
Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c

Technical Specifications - Graphics

	Available Graphics drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html
NVIDIA Quadro FX 4600 (768 MB)	Graphics controller	NVIDIA Quadro FX 4600 Workstation GPU
	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	768 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	Multi-monitor Support	Dual integrated display controllers supporting up to 2048x1536 @ 75Hz (analog) or 3840x2400 @ 41Hz (digital) on both displays
	NVIDIA Quadro FX 4600 Architecture	384-bit memory interface 67.2 GB/sec. memory bandwidth Full 128-bit floating point color precision 12-bit subpixel precision 65,536 fragment instruction 65,536 vertex instruction 3D volumetric textures Single-system powerwall Hardware accelerated antialiased points & lines Hardware OpenGL® overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes Hardware two-sided lighting 3rd-generation occlusion culling OpenGL quad-buffered stereo Hardware-Accelerated Pixel Read-Back
	Shading Architecture	16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	High-level Shader Languages	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
	High-resolution Antialiasing	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
	Display Resolution Support	Dual Dual Link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 41Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each

Technical Specifications - Graphics

	nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
	Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
	Available Graphics drivers	Microsoft Windows XP Professional, Microsoft Windows Vista Professional, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html
NVIDIA Quadro FX 5500 PCIe Graphics (RF089AA)	Graphics controller	NVIDIA Quadro FX 5500 Workstation GPU
	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	1 GB GDDR2 SDRAM unified graphics memory
	Connectors	2 Dual-link DVI-I, 1 Stereo
	Multi-monitor support	Yes
	NVIDIA Quadro FX 5500 Architecture	256-bit memory interface 33.6 GB/sec. memory bandwidth Full 128-bit floating point color precision 12-bit subpixel precision Unlimited fragment instruction Unlimited vertex instruction 3D volumetric textures support Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL® overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd-generation occlusion culling OpenGL quad-buffered stereo Hardware-Accelerated Line Strippling 16 textures per pixel in fragment programs Window ID clipping functionality
	Shading Architecture	Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	High Level Shader Languages	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
	High-Resolution Antialiasing	12-bit subpixel sampling precision enhances AA quality Rotated Grid Full Scene Antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200

Technical Specifications - Graphics

Display Resolution Support	2 Dual-link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 24Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each
nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft® Windows®.
Supported Graphics APIs	OpenGL 2.0 DirectX 9.0c
3D Primitive Perf	Geometry (Triangles per Second) 225 Million Fill Rate (Texels per Second) 15.6 Billion
Available Graphics drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Windows XP Professional x64 Edition, Linux® - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html

HP L1965 19-inch LCD Monitor	Panel	Type	Active matrix, thin film transistor (TFT)
		Viewable Image Area (diagonal)	19 inches; 48.25 cm maximum viewable
		Screen Opening (WxH)	14.9 x 12.0 inches; 38.0 x 30.5 cm
		Viewing Angle (typical)	178 degrees horizontal/178 degrees vertical (10:1 minimum contrast ratio)
		Brightness (typical)	300 nits (cd/m2)
		Contrast Ratio (typical)	1000:1 (typical)
		Response Rate (typical)	6 ms (typical gray to gray)**
		Pixel Pitch	0.294 mm
		Backlight Lamp Life (to half brightness)	50K hours
		* NOTE: All performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower. **NOTE: 20 ms rise and fall	
	Video/Other Inputs	Plug and Play	Yes (supports VESA DDC2B and DDC/CI; PC2001 compliant)
		Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)
		Input Signal	Two DVI-I connectors (VGA analog or digital)
		Input Impedance	75 ohms ± 2%
		Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green (activated through on-screen display)
		Video Cable	One DVI-D to DVI-D, and 1 DVI-I to VGA cables
		Video Cable Length	71 in (1.8 m)
	Signal Interface/ Performance	Horizontal Frequency	24 to 83 kHz
		Vertical Frequency	48 to 76 Hz
		Native Resolution	1280 x 1024 @ 75 Hz analog 1280 x 1024 @ 60 Hz digital
		Maximum Resolution (Analog)	1280 x 1024 @ 75 Hz analog
		Maximum Resolution (Digital)	1280 x 1024 @ 75 Hz analog
		Preset VESA Graphic Modes (non-interlaced)	640 x 480 @ 60 Hz, 72 Hz, 75 Hz 720 x 400 @ 70 Hz 800 x 600 @ 60 Hz, 72 Hz, 75 Hz 1024 x 768 @ 60 Hz, 70 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz
		Preset MAC Mode	832 x 624 @ 75 Hz 1152 x 870 @75 Hz
		Preset VGA Mode	640 x 480 @ 60 Hz, 72 Hz
		Preset SUN Mode	1152 x 900 @ 76 Hz

		Fail Safe Mode	Yes (limits out of range signal messages)
		Maximum Pixel Clock Speed	140 MHz
		User Programmable Modes	Yes, 15
		Anti-Glare	Yes
		Anti-Static	Yes
		AssetControl	Yes (accessible on HP Compaq Business Desktops featuring Intelligent Manageability)
		Default Color Temperature	Yes (6500k, 9300k, SRGB, Custom User)
	On Screen Display (OSD) Controls	Buttons or Switches	Power on/off; 3-button OSD; second level OSD buttons include dual-input switch, dedicated auto adjust switch
		Languages	English, Spanish, French, German, Netherlands, Italian, Japanese, Simplified Chinese
		User Controls	Size and Positioning Contrast Brightness Clock, Clock Phase Selectable Color Temperature Serial Number Mode Displayed Sleep Timer Input Selection Factory Reset
Power		Power Supply	Auto-ranging, 90 to 265 VAC; internal power supply
		Input Power	100 ~ 240 VAC
		Nominal Current	1.5 A maximum
		Frequency	50 ~ 60 Hz
		Typical Power Consumption	< 35 watts
		Maximum	< 55 watts
		Power Saving	< 2 watts
		Off Mode	0 watts (when master power switch is in the off position)
		Power Cable Length	74.8 in (1.9 m); non-captive
Mechanical		Dimensions (H x W x D)	Unpacked with stand: 14.85 min to 18.79 max x 15.9 x 8.78 inches (37.72 min to 47.72 max x 40.39 x 22.29 cm)
			Base Area (Footprint D x W): 8.78 x 11.88 inches (22.29 x 30.18 cm)
			Panel only (without stand) (H x W x D): 12.96 x 15.9 x 2.4 inches (32.91 x 40.39 x 6.1 cm)

	Weight	Unpacked with stand	15.6 lbs (7.06 kg)
		Unpacked without stand	9.26 lbs (4.19 kg)
		Packaged	20.5 lbs (9.27 kg)
	Bezel Width	12.5 mm left and right, 12.75 mm top and bottom	
	Tilt Range	-4 degrees to +30 degrees	
	Swivel Range	± 45 degrees horizontal swivel	
	Height Adjustable	Yes (4 in/100mm adjustment range)	
	Pivot Rotation	Yes, 90 degrees	
	Base	Ships attached and is removable	
Environmental	Temperature – Operating	41° to 95° F (5° to 35° C)	
	Temperature – Non-operating	-4° to 140° F (-20° to 60° C)	
	Humidity – Operating	20% to 80%	
	Humidity – Non-operating	5% to 95%	
	Altitude – Operating	0 to 12,000 ft (0 to 3,658 m)	
	Altitude – Non-operating	0 to 40,000 ft (0 to 12,192 m)	
Environmental Data	Eco-Label Certifications and Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:	

- US Energy Star
- CECP

Energy Consumption (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	35.7 watts	35.6 watts	35.1 watts
Sleep	1.08 watts	1.14watts	1.23 watts
Off	0.93 watts	0.94 watts	0.92 watts
Heat Dissipation*	100 VAC, 50 Hz	115 VAC, 60 Hz	230 VAC, 50 Hz
Normal Operation	121.7 BTU/hr	121.4 BTU/hr	119.7 BTU/hr
Sleep	3.68 BTU/hr	3.89 BTU/hr	4.19 BTU/hr
Off	3.17 BTU/hr	3.21 BTU/hr	3.14 BTU/hr

*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Longevity and Upgrading	Upgradeability features contained in the product include: One upstream and four downstream USB ports
Ergonomics	The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.
Additional Information	This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.

This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 100% recycled materials (by wt.)

This product is 100% recycleable when properly disposed of at end of life.

Packaging Materials

- Corrugated - 0.955 kg
- Plastic (other) - 0.055 kg
- Polystyrene - 0.24 kg

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances

		• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)
	Packaging	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
	End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
	Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html
Options	HP Silver Flat Panel Speaker Bar	Powered directly by the monitor or PC, seamlessly attaches to the monitor's bezel to bring full multimedia support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately, part number EE418AA. For more information, refer to the HP Flat Panel Speaker Bar QuickSpecs.
Other	Accessories Included	One DVI-D to DVI-D cable, one DVI-I to VGA cable, one USB cable, and CD-ROM with Pivot Pro software, HP Display Assistant software, and HP Display LiteSaver software.
	Software	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or

		keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese. HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC. HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	User Guide Languages	English, Bahasa, B. Portuguese, French, LA Spanish, Korean, Simplified Chinese, Traditional Chinese, Japanese, Danish, Dutch, Finnish, German, Italian, Norwegian, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English
	Color	Carbonite, two-tone carbonite and silver (EMEA only)
	VESA Mounting	Yes (swing arm/wall mount not included); base must be removed for mounting options)
	VESA External Mounting	Yes (standard 4 hole pattern, 100 mm)
	Kensington Lock-ready	Yes
Certification and Compliance		Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 13406-2 Compliant (Pixel Defect Guidelines), Mexican NOM Approval, MPR-II Compliant, PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 or 03 depending on region (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft® Windows® Certification
Compatibility		VESA Video Signal Standard (VSIS) Compliant video cards have been tested and proven compatible for use with the HP LP1965 Flat Panel Monitor. Recommended for use with HP products.
Service and Warranty		Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

HP LP2065 20-inch LCD Panel Monitor	Type	20-inch Active Matrix TFT (thin film transistor)
	Viewable Image Area (diagonal)	20.1 inches; 51 cm
	Screen Opening (W x H)	16.2 x 12.17 inches; 41.1 x 30.9 cm

	Viewing Angle (typical)*	Up to 178° horizontal/178° vertical (10:1 minimum contrast ratio)
	Brightness (typical*	Up to 300 nits (cd/m2)
	Contrast Ratio (typical)*	Up to 800:1
	Response Rate (typical)*	8 ms (gray to gray), 16 ms (rise + fall)
	Pixel Pitch	0.255 mm
	Backlight Lamp Life (to half brightness)	45K hours
On Screen Display (OSD) **Controls**	**Buttons or Switches**	Input select, auto adjust/OSD up, OSD down, OSD menu select, power
	Languages	English, French, German, Spanish, Italian, Dutch, and Japanese
	User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection, image control (including scaling), and factory reset
Signal Interface/ Performance	**Horizontal Frequency**	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Vertical Frequency	48 to 85 Hz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Native Resolution	1600 x 1200 @ 60 Hz (recommended)
	Preset VESA Graphic Modes (non-interlaced)	1600 x 1200 @ 60 Hz, 75 Hz (VGA input) 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 85 Hz 640 x 480 @ 60 Hz, 75 Hz, 85 Hz
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 10
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
Video Input	**Plug and Play**	Yes

	Input Signal	Four connectors, including one 15-pin mini D-sub VGA, one DVI-I (VGA analog and digital input), one composite video, and one s-video	
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)	
	Input Signal	Two DVI-I connectors (dual VGA analog or dual digital input possible)	
	Input Impedance	75 ohms ± 10%	
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green	
	Video Cable	Two VGA to DVI-I; two DVI-D to DVI-I	
	Video Cable Length	5.9 feet; 1.8 m	
Power	Input Power	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz	
	Frequency	47.5 to 63 Hz	
	Typical Power Consumption	55 watts (without USB ports); 70 watts (USB ports fully loaded)	
	Maximum	< 75 W	
	Power Saving	< 2 watts	
	Power Cable Length	5.9 feet; 1.8 m	
Mechanical	Dimensions (H x W x D)	Unpacked with stand	16.7 to 21.8 x 17.4 x 8.67 in 42.5 to 55.5 x 44.3 x 22.0 cm
		Unpacked w/o stand (head only)	13.58 x 17.4 x 3.42 in 34.5 x 44.3 x 8.7 cm
		Packaged	11.77 x 22.2 x 16.77 in 29.9 x 56.4 x 42.6 cm
	Weight	Unpacked	With stand: 20.28 lb (9.2 kg); Without stand: 12.35 lb (5.6 kg)
		Packaged	26.3 lb (11.95 kg)
	Tilt Range	-5° to + 25° vertical tilt	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 inches; 13.0 cm	
	Pivot Rotation	Yes	
	Base	Detachable, ships attached	
Environmental	Temperature – Operating	46° to 95° F (10° to 35° C)	
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)	
	Humidity – Operating	20% to 80% non-condensing	
	Humidity – Non-operating	5% to 85%	

	Altitude – Operating	+12,000 feet; +3,657.6 m
	Altitude – Non-operating	+40,000 feet; +12,192 m
Options	HP Silver Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or the PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately. For more information, refer to the HP Silver Flat Panel Speaker Bar QuickSpec.
Other	Accessories Included	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #1 or 2 (DVI-I analog) connector. DVI-D to DVI-I cable – connects the graphic card's DVI-D digital connector to the monitor's input #1 or #2 (DVI-I digital) connector.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Software	HP Display Assistant Utility makes it possible to adjust displays settings through the PC using two-way communication via DDCI. HP Display Lite Saver allows ability to power up and down display at predetermined hours of the day to safe power and backlight life. Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
	User Guide Languages	English
	Warranty Languages	English
	Color	Carbonite/Silver
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
Certification and Compliance		Canadian Requirements/CSA, CE Marking, CISPR Requirements, , Energy Star 3.0 Compliant, FCC Approval, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval,, MPR-II Compliant, PC2001 Compliant, PC99 Certified, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)
Compatibility		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.

	Service and Warranty		Three years parts, labor, and on-site service. 24-hour 365-day 1-800 technical support. Replacement options include 2nd business day on-site service or next business day direct replacement. With direct replacement, HP will ship a replacement display product directly to you. Using the shipping labels provided, return your failed display to HP. Certain restrictions and exclusions apply. For details, contact HP Customer Support.
HP LP2465 24-inch Widescreen LCD Monitor	Panel	Type	24-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	24 inches; 60.96 cm
		Screen Opening (W x H)	20.47 x 12.83 inches; 52.0 x 32.6 cm
		Viewing Angle (typical)*	178° H/ 178° V (10:1 minimum contrast ratio)
		Brightness (typical)*	500 nits (cd/m^2)
		Contrast Ratio (typical)*	1000:1
		Response Rate (typical)*	8 ms (typical gray to gray)
		Pixel Pitch	0.270 mm
		Backlight Lamp Life (to half brightness)	50K hours
		*Response time 13 ms rise and fall, 6 ms gray to gray.	
	On Screen Display (OSD) Controls	Buttons or Switches	Input Select, Auto Adjust, OSD Up, OSD Down, OSD Menu Select, Power
		Languages	English, French, German, Spanish, Italian, Japanese, Dutch
		User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset
	Signal Interface/ Performance	Horizontal Frequency	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input) (for modes with pixel clock less than 157 MHz)
		Vertical Frequency	48 to 85 Hz (VGA and DVI input)
		Native Resolution	1920 x 1200 @ 60 Hz (recommended) (native aspect ratio of 16:10)
		Preset VESA Graphic Modes (non-interlaced)	1920 x 1200 @ 60 Hz 1600 x 1200 @ 60 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 75 Hz 640 x 480 @ 60 Hz, 75 Hz
		Text Mode	720 x 400 @ 70 Hz
		Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz

	Sun Mode	1152 x 900 @ 66 Hz	
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)	
	User Programmable Modes	Yes, 20	
	Anti-Glare	Yes	
	Anti-Static	Yes	
	Default Color Temperature	6500 K	
Video/Other Inputs	Plug and Play	Yes	
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)	
	Input Signal	Two DVI-I (VGA analog and digital) inputs	
	Input Impedance	75 ohms ± 10%	
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green	
	Video Cable	VGA to DVI-I; DVI-D to DVI-D	
	Video Cable Length	5.9 feet; 1.8 m	
Power	Input Power	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz	
	Frequency	47.5 to 63 Hz	
	Typical Power Consumption	75 watts	
	Maximum	< 110 watts	
	Power Saving	< 2 watts	
	Power Cable Length	6.2 feet; 1.9 m	
Mechanical	Dimensions (H x W x D)	Unpacked w/ stand	14.6 (min) to 19.7 (max) x 22 x 9.1 in 37.1 (min) to 50.1 (max) x 55.4 x 23.2 cm
		Unpacked w/o stand (head only)	14.4 x 22 x 3.7 in 36.6 x 55.84 x 9.2 cm
		Packaged	11.7 x 22.1 x 25.6 in 29.8 x 56.0 x 65.1 cm
	Weight	Unpacked	23.6 lbs (10.7 kg)
		Packaged	23.6 lbs (10.7 kg)
	Tilt Range	-5° to + 25° vertical	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 inches; 130 mm	
	Pivot Rotation	Yes	
	Base	Detachable, ships detached	
Environmental	Temperature – Operating	46° to 95° F (10° to 35° C)	

	Temperature – Non-operating	6° to 140° F (-10° to 60° C)
	Humidity – Operating	20% to 80% non-condensing
	Humidity – Non-operating	5% to 85%
	Altitude – Operating	+12,000 feet; +3,657.6 m
	Altitude – Non-operating	+40,000 feet; +12,192 m
Other	Accessories Included	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #2 (DVI-I analog) connector DVI-D to DVI-D cable – connects the graphic card's DVI-D digital connector to the monitor's input #2 (DVI-I digital) connector
	Software	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese. HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC. HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite/silver
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
Options	HP Silver Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select

			HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
	Certification and Compliance		Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star 3.0 Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)
	Compatibility		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
	Service and Warranty		Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.
HP LP3065 30-inch Widescreen LCD Monitor	Panel	Type	30.0-inch Wide Format Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	29.77 in (75.623 cm)
		Screen Opening (W x H)	25.3 x 15.8 in (64.3 x 40.3 cm)
		Viewing Angle (typical)*	Up to 178° H/ 178° V (10:1 minimum contrast ratio)
		Brightness (typical)*	300 nits (cd/m2)
		Contrast Ratio (typical)*	1000:1
		Response Rate (typical)*	12 ms (8 ms average gray to gray)
		Pixel Pitch	0.250 mm
		Backlight Lamp Life (to half brightness)	40K hours
		Color Gamut	92% of NTSC
	On Screen Display (OSD) Controls	Buttons or Switches	Input select, brightness up, brightness down, power
		User Controls	Brightness, input selection
	Signal Interface/ Performance	Horizontal Frequency	100 KHz
		Vertical Frequency	60 Hz

	Native Resolution	2560 x 1600 @ 60 Hz (native aspect ratio of 16:10)	
	Pixel Clock Speed	275 MHz	
	Anti-Glare	Yes	
	Anti-Static	Yes	
	Default Color Temperature	6500 K	
Video/Other Inputs	Plug and Play	Yes	
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)	
	Input Signal	Three dual-link DVI-D inputs (Windows PC and graphics card that supports DVI ports with dual-link digital bandwidth and VESA DDC standard for plug-and-play setup requires a DVI-D dual-link graphic card that supports WQXGA (2560 x 1600) resolution.)	
	Video Cable	Two dual-link DVI cables	
	Video Cable Length	5.9 ft (1.8 m)	
Power	Input Power	Auto-Ranging, 100 to 240 VAC; internal power supply, 50 Hz/60 Hz	
	Typical Power Consumption	118 watts	
	Maximum	< 176 watts	
	Power Saving	< 2 watts	
	Power Cable Length	5.9 ft (1.8 m)	
Mechanical	Dimensions (H x W x D)	Unpacked w/ stand	19.3 to 23.2 x 27.2 x 9.5in (49.0 to 59.0 x 69.2 x 24.0 cm)
		Unpacked w/o stand (head only)	17.9 x 27.2 x 3.3 in (45.5 x 69.2 x 8.4 cm)
		Packaged	22.4 x 31.1 x 14.9 in (56.8 x 79.0 x 37.8 cm)
	Weight	Unpacked	30.6 lbs (13.9 kg)
	Tilt Range	-5° to + 30° vertical	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 in (100 mm)	
	Pivot Rotation	No	
	Base	Detachable, ships detached	
Environmental	Temperature – Operating	46° to 95° F (10° to 35° C)	
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)	
	Humidity – Operating	20% to 80% non-condensing	

	Humidity – Non-operating	5% to 85%
	Altitude – Operating	+12,000 ft
	Altitude – Non-operating	+40,000 ft
Environmental Data	Eco-Label Certifications and Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • US Federal Energy Management Program (FEMP) • IT Eco Declaration • TCO 03 • Taiwan Green Mark • CECP • Korea Eco-label • EPEAT - Silver

Energy Consumption (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	102.8 watts	101.7 watts	100.4watts
Sleep[1]	2 watts	2 watts	2 watts
Off	0.05 watts	0.06 watts	0.25 watts
Heat Dissipation[2]	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	350.8 BTU/hr	347.0 BTU/hr	342.6 BTU/hr
Sleep	6.8 BTU/hr	6.8 BTU/hr	6.8 BTU/hr
Off	0.2 BTU/hr	0.2 BTU/hr	0.9 BTU/hr

NOTES

[1]This sleep status ignore the input sync signal check cycle when metering the model in sleep mode.

[2]Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Longevity and Upgrading	Upgradeability features contained in the product include: One upstream and four downstream USB ports
Ergonomics	The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.
Additional Information	This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC. This HP product is designed to comply with the

Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.

This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).

This product is in compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see www.epeat.net.

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 0% recycled materials (by wt.)

This product is 97.6% recycleable when properly disposed of at end of life.

Packaging Materials

- Corrugated Paper 2.19 kg
- PE-LD Bags 0.09 kg
- EPS Molded Foam 1.07 kg

RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium

- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

Hewlett-Packard Corporate Environmental

For more information about HP's commitment to the environment:

	Information	Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html
Other	Accessories Included	Two dual link DVI-D to DVI-D cables - connects the graphic card's DVI-D digital connector to the monitor's input (DVI-D digital) connectors; power cord
	Software	HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
Options	HP Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
Certification and Compliance		Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals.
Compatibility		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
Service and Warranty		Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-

site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

© Copyright 2007 Hewlett-Packard Development Company, L.P.
The information contained herein is subject to change without notice.

All rights reserved. Microsoft, Windows, Windows Vista, and Windows XP are registered trademarks or trademarks of Microsoft Corporation in the U.S. and/or other countries. Intel and Xeon are US registered trademarks of Intel Corporation. Linux is a registered trademark of Linus Torvalds in the United States and other countries. AMD, AMD Opteron, AMD-8131 and combinations thereof, are trademarks of Advanced Micro Devices, Inc.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.